The Working of the Mind in Piano Teaching and Playing

HANS SCHNEIDER

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The Working of the Mind in Piano Teaching and Playing

An Application of the Principles of Psychology and Physiology to the Work of the Teacher and Player of the Piano and other Instruments

By

HANS SCHNEIDER

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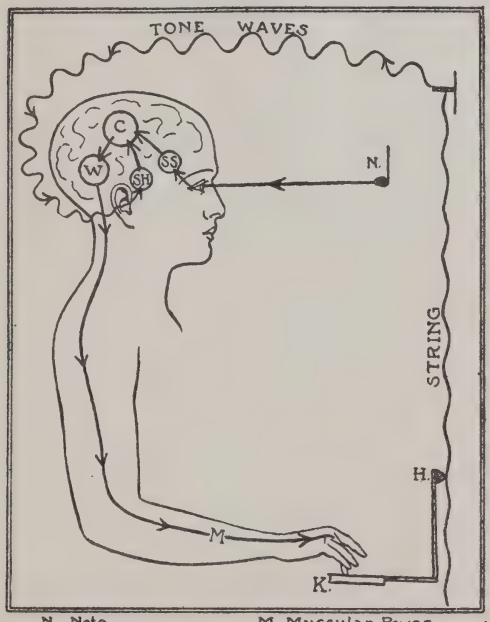
All science must be applied in order to become of real value to the world.

RIBOT.

To the Memory of My Mother

The Psycho-Physiological Process of a Piano Tone



N. Note
SS. Sense of Seeing
C. Consciousness
W. Will Power
M. Muscular Power
K. Key
H. Hammer
S.H Sense of Hearing

Diagram by
HANS SCHNEIDER

Preface

In late years the psycho-physical aspect of piano playing has come deservedly more and more into the foreground and gradually claimed the attention of the progressive teacher.

Progress is still slow, is still a matter for a hard fight, as is generally the case when deeply rooted traditions, cherished ideals and truths have to be sent to the scrap heap that Father Time establishes now and then on the corners of periods of development, for the benefit of progress.

The seeking of new truth is always connected with many endeavors that lead off into nowhere or, which is worse, into the opposite direction. The one who blazes a new trail through the virgin forest is apt to lose his bearings.

But this is only natural. The author himself recollects, with much satisfaction and glee, having made the remark in a lecture in Boston at the early stage of his investigations "that the fingers are the most superfluous part of the arm so far as piano playing is concerned." —*Pater peccavi!*

.. But this carrying of a new principle *ad absurdum* is only the consequence of the true insight into conditions; it is but the outcome of an over-valuation of principles nevertheless true, of the new state of affairs. And, after all, failure is the basis of all success.

During the past seventy-five years a large number of devoted, earnest and sincerely progressive piano

pedagogues have labored unselfishly to find a fundamental typical condition for piano technic, a basis to which all piano motions could be reduced, and a common typical condition where all should start.

In this endeavor many often violently contrasting principles have been advocated, but the matter is becoming clarified and more simple.

The basic idea of all these reforms was the rebellion against the old pure finger technic, which was still handed down theoretically from "Method" to "Method," but which practically had ceased to be of value when the heavy modern piano action made its application impossible. The opening shot was fired by Stoewe with his *Clavier Technic demonstrated as a Science of Motion.* More and more the idea of looking upon technic from a mechanical viewpoint gained a foothold, and gradually from out the deeper and ever deeper insight which came from unbiased study and observation piano technic has developed into a physiologic science of motion which can, for a while, be entirely separated from music.

And this is as it should be. Music is the final goal of all piano technic; but it is *not piano technic.* If we wish to get a clear understanding of and an insight into the latter we must eliminate music during the period of our research and observation.

Modern philosophy emphasizes the spiritual element strongly as a reaction of the great physiologic period of the English philosophers. On the other hand physiology and psychology are coming closer together by ascribing many psychologic phenomena to physiologic causes. These two forces at work have also influenced our view of piano playing and gradually the physiologic science of motions has found its true mate and now we recognize the psycho-physiologic science of motion.

For the first time since "my lady" took her little virginal with needle cushion attached out into the garden under the linden tree has piano technic reached the

true haven after having sailed the seas through seven centuries like the Flying Dutchman. Thrown about by the waves of emotion and feeling it was saved from going ashore by divine intuition and God-given pianistic instinct only.

It is no wonder. What attracts us first and most will claim our interest and attention. When we are out in a canoe in the middle of a lake on a moonlight summer's night, but little do we care for planetary differentiations of this or that orbit, the rate of speed or frequency of return in the next two million years.

The old pedagogue went by instinct alone, individually and personally always the safest road to take, provided one has to deal with pupils who possess it and not with those who never will have it. Yet the latter are the majority of pupils; in their case teaching makes up for the absent instinct. We must make them play as if they really had it and so carry the burden of white and black keys through our life, full of rich devotion and poor rewards.

But science is lifting this burden more and more and will keep on doing so. This book is an attempt to assist in the endeavor and to help the fellow teacher in his work.

The book is the outcome of fifteen years of hard study and close observation. It has grown naturally in the studio at the piano and at the desk in the class room. Its material formed a course of lectures given in my school before the normal students and is therefore not abstract but the result of practical teaching.

Its start was due to the desire to do better work, to be able to answer pupils' questions, to improve pupils' work, to find and then to overcome the obstacles that seemed to be in the way of success to most of them. It was not an easy task for the material had to be collected from abstract scientific works on anatomy, physiology, and psychology; after that deductions had to be made from these principles to apply to piano playing. Often these proved wrong; a new

start had to be made and what had been written relegated to the waste basket. Six times this treatment was necessary until now I feel reasonably sure that I have penetrated as far as is possible into the psycho-physical reasons and foundations of piano technic.

This book is not a method, but an attempt to give to the piano teacher a text-book in which all fundamental principles are dealt with from an unbiased scientific and above all from a non-musical point of view.

It is but the first volume of an extensive and complete work, "The Psycho-physiology of Piano Teaching and Playing." The other parts in preparation are:

The Working of the Body.

The Physiology of Motion.

The Mechanism of Piano and Tuning Production.

True insight into these will enable the teacher to build up for himself any method he chooses, to do with it what he wishes, and then to call his method whatever he wants to. Yet there exists but one true method. This is the recognition of the individuality of the pupil by the teacher through his knowledge of the fundamental essentials and the choice of what is best suited to each pupil.

Introduction

Physiology of Piano Playing

Under physiology we understand the dealing with the nature of things. It gives us the reasons for their existence and the relationship between their single parts and to other things. Applied to Art in general it deals with the physical as compared with the æsthetic side, and with the actual work or handicraft as compared with emotions and conceptions.

Physiology of Piano Playing, therefore, deals with the non-artistic, non-emotional, non-musical side of piano playing. It deals with the Central Nervous System as muscle-directing energy, with the muscular tissue as motion producer.

Energy

The basis of all our work is energy, by which is understood the useful labor produced by the action of one body upon another. The energy at the disposal of a human being and expended by him is his vitality which he uses up in his efforts.

Vitality is the physical capital with which the human being is endowed at his birth. It is a force that, like all other forces capable of work in the whole universe, remains unchanged. We cannot add to it; but we can economize in its expenditure by using the most advantageous forms and modes of working it.

We can use up our vitality mentally or physically, for there is but one; and our working ability depends a great deal upon economy of this vitality. A tired brain will ultimately prevent the muscular system from

doing its best work, and *vice versa,* a tired muscular system will handicap the brain in its work.

The greater or smaller amount of energy expended upon a task brings about the endless variety and modifications of the results. As our will power is often stronger than our physical resources it happens frequently that an individual overdraws his account and must suffer the consequences.

Piano playing is a demonstration of energy, a transmission of the human nerve and muscular power to the mechanism of the piano and in a ratio absolutely balanced; so much power expended, so much result in return; and as in all finely balanced exchanges, "too little" or "too much" may fail to produce the wanted effect. The understanding of the proper amount of power necessary to produce certain effects and the ability to control this power is the true foundation of all piano playing and teaching. The reason for most failures is not so much lack of power as wasteful overexertion.

Bodily skill in everything, therefore in piano playing, is the gradual elimination of surplus or useless motions, the gradual cutting down of muscular effort to just the proper amount necessary, to a final beautiful and well-balanced union between the labor to be performed and the muscular exertion which is to perform it.

Thus skill means a saving of effort, an economy in the use of bodily capital, energy and vitality; as skill is but the consequence of correct habits the greatest saving of vitality lies in contracting correct habits from the very beginning. By "correct" is to be understood that which is most natural, most rational and easiest for the beginner to do.

THE PROCESS OF A SINGLE PIANO TONE

The production of a single piano tone, simple as it may look when an accomplished pianist strings thousands of tones together with lightning-like rapidity, is

nevertheless a most complicated affair. It is one in which the most varied processes cooperate and follow each other in rapid succession, never to be changed, none to be omitted, unless the whole process be immediately doomed to failure. While with the pianist this chain of causations rolls off smoothly and unnoticeably, with the child beginner it is a laborious process, one which can be followed only step by step. For whenever one force gives way to another the child must stop and bridge the chasm over until constant repeating has gradually smoothed these rough places and made a harmonious unit of the whole process.

The child sees the symbol (note) on the paper. Employing the sense of seeing he knows from experience (teaching) that this note, say, for instance, C, has a corresponding key on the piano which is to be played or sounded. He now makes up his mind (the popular way of defining will power) to play this note, and from the motor center a command is sent to the nerve plexuses which run from the upper part of the spinal column into both arms, hands and fingers. If the right hand is to be active the command comes from the left side of the brain and *vice versa.*

Like a message sent over a wire this command runs along the nerves, crossing from the large arm nerves into the smaller ones of the hand and the fingers and, finally, the command is delivered at the nerve plates of those particular groups of muscles which are to do the actual playing.

So far, everything has been the work of senses and nerves. Now the muscular power begins to work. The work of the muscles is done by contracting; and they now contract in the measure that, through experience, has been found necessary to overcome the resistance of the key. The moment the finger comes in contact with the key the human energy is transferred in exact ratio to the so-called action of the piano, and FOR A WHILE THE HUMAN FACTOR IS ENTIRELY ELIMINATED

FROM THE PROCESS. Through key and hammer the energy is transferred to the string, and another change in force takes place according to mechanical law.

A law of acoustics decrees that an agitated string can vibrate only so many times a second and must produce a tone of a certain pitch in each case. But physical law reaches still farther. The string transmits its state of agitation to the air surrounding it. With the air acting as transmitter the vibration of the string finally reaches the ear of the player as sound wave. When this sound wave reaches the inner ear it excites a very sensitive organ (organ of Corti) which will vibrate sympathetically in the exact manner and frequency of the vibration of string. Through the auditory nerve this disturbance of the inner ear is carried to the auditory center, and the player becomes conscious of having played the note C, of the paper, on the proper key of the piano.

The whole process is a circle of mental, muscular, mechanical, and again mental action, but it was mind FIRST and mind LAST. The muscles of the arm are only the servants of the mind and the executors of its orders. *"L'esprit gouverne, le corps obeit* (The mind governs, the body obeys)" (Wetterstrand). The close connection of these different individual processes is easily proved when we make the experiment of omitting just one.

The symbol on the paper does not exist to a blind person, neither do the sound waves to one whose hearing is impaired. The absence of a key would make the finest muscular power useless, the absence of the string would make of no avail the most delicate of touch, while the absence of an acoustic transmitter would fail to bring the result of all these motions to the player's ear and he would have to depend upon his eyesight for control, as he must in playing on a dumb keyboard.

The connection of such single tone processes with others in endless, ever-varying combinations forms

piano technic. By constantly repeating these connections (practising) this process is gradually made smoother and faster, and finally entirely automatic; then the player may express whatever emotions the music arouses in him, unhampered by thoughts of the technical labor. This must be the final aim of all piano teaching.

Physiology of the Central Nervous System

All our efforts have their origin in the Central Nervous System. It is therefore necessary that a piano teacher should have at least a rudimentary knowledge of the physiology of this central nervous system.

The relation between the central nervous system and the body may be best compared with that of the main office of a telephone sysaem and its sub-stations, in which the nerve cells represent the instruments and the nerves the wires. The nerve trunks, coming from the spinal column, extend into the different sections of the body where they divide into smaller branches and then into microscopic fibers; so that finally every part of the body is in constant communication with the nerve center proper. But not only is the central nervous system connected with the different sections of the body; the nerve cells themselves are inter-connected by fibers which run from cell to cell, like vines in an arbor, an arrangement therefore called arborization.

The central nervous system is located in the spinal column and its extension known as the brain. The spinal column consists of many separate vertebræ (thirty-one in number) of which the different groups are connected with different sections and members of the body through sixty-two nerve trunks. Of these groups one consisting of eight and located in the lower part of the neck is closely connected with piano playing. For the nerves running from these vertebræ, known as the Arm plexus, are connected with the different arm-muscle groups and control the motions of

the arm, hand and fingers. They are the wires over which the central nervous system's commands are transmitted.

The spinal column is filled with gray matter in the center surrounded by a layer of white matter. The white consists mostly of nerve fibers and the gray matter of innumerable nerve cells. "The central nervous system is nothing but a mechanism for receiving impulses and discharging reactions" (James). But as piano playing is also the result of received impulses and discharged reactions or of perceptions and motions the knowledge of the working of this sensitive organism is most useful to the teacher in tracing, understanding and remedying many faults of his pupils. For all education of the muscles is "really but education of the spinal cord" (Martin). Here are the coordinating centers for the different muscle groups. In other words, all muscular efforts are the result of processes in the spinal column or the central nervous system. Piano playing, in the final analysis, is but a matter of motions and will be treated in this book from that point of view.

THE BRAIN.

The continuation of the spinal column matter into the skull is called the brain and consists of millions of nerve cells, often also referred to as gray matter. The brain is the seat of consciousness and intelligence, *but is not consciousness and intelligence itself.* Our consciousness is not aware of the processes going on in the brain; it only registers the result.

The activity of the brain is a double one. The higher centers tend to the finer sensations and intellectual functions such as hearing, seeing, etc., while the lower centers are occupied with the reflex motor functions, and the cerebellum with combined muscular movements. Therefore the seat of piano motions, after having become acquired or habitual, would be found in the last named, the cerebellum.

The brain is a most sensitive organ, one which can be improved by exercise provided by our senses, a process commonly called education. For in reading and listening to Music it is not the ear and eye which become educated, but the brain. It is so also with motions on the keyboard. For finger activity without brain action, conscious or unconscious, is unthinkable; while all motor exercise is beneficial to the brain and helps to develop it.

If, for instance, a student should play F, B, D, G, instead of F#, B, D, G, the mistake is made in the brain; the finger which played F instead of F# carried out the mistake of the brain only and is not in itself at fault. A "mis-take" is always the result of a "mis-thought."

Conductivity and Contractility

In the mutual relations between nerve center and muscles the nerves have the office or power to conduct impulses, sensations and stimuli. The muscles have the power to contract for the purpose of motions. Both properties, conductivity and contractility, are known under the collective name of irritability which is the power to respond to an outside stimulus.

In piano playing this irritability consists of the perception of the written music which acts as a stimulus and is conducted over nerve fibers to its proper centers. From here it proceeds, changed into a command to the muscles; these contract, act and move arm, fingers, or whatever is intended to be moved.

This combined process may be explained as sensation, reaction and motion, and finally develops into knowledge, will power, skill.

Nerve Cells and Nerve Trunks

In the central nervous system there are estimated to be between two and three thousand millions of nerve cells. All these little microscopic organisms are physically independent, yet they are in direct or indirect

communication with each other through fibers or prolongations which extend from the main part or nucleus. Of these fibers one is of more importance and is known as the axis cylinder. Many of these are often combined to make one nerve trunk.

Nerve cells are nourished by the blood which the heart sends to them while active. This nourishment is assumed to change chemically and to create a certain tension which leaves the cell as a discharge of energy. Nerve trunks consist of bundles of axis cylinders which are enclosed by a covering for insulating purposes, like the wires in a cable. Thus a nerve trunk may hold a number of nerve fibers, each performing different functions without interfering with each other. They are the means of communication between nerve cells and muscles. Neither cell nor muscle is independent, for the muscle depends upon the nerve cells for its stimulus or innervation, and the nerve cell looks to the muscle to realize its order.

Each nerve naturally has two terminals, one in the nerve cell proper, and one in a muscle which it enters by a so-called nerve plate, or innervation point; when such an entering point of a nerve is stimulated by an electric current the muscle will immediately contract. Like the electric stimulation the one coming from the nerve cell itself is absolutely mechanical; and this proves, as has been said before, that the central nervous system and its various parts have no consciousness; it is but a mechanism. When applied to fundamental piano playing it shows us the great truth THAT IN TEACHING WE CAN SEPARATE THE MECHANICAL PART ENTIRELY FROM THE ARTISTIC AND MUSICAL; IN FACT WE MUST SEPARATE FIRST IN ORDER TO BE ABLE TO DO ARTISTIC WORK LATER ON.

There are two different kinds of nerves, afferent nerves, running in from the surface or periphery of the body and carrying sensations; these are, therefore, also called sensory nerves. The other nerves—called efferent nerves—run in the opposite direction from brain

to surface, and as they carry the command of motions to the muscle they are called motor nerves.

When a piano player sees a note the sensation is brought to the central nervous system and finally to his consciousness by the sensory nerves; but when he plays it on the keyboard the command to act has been delivered to his muscle by a motor nerve, and again the sensation of having touched the key is reported back by a sensory nerve.

We have no knowledge of how this is done. We can see only the result. For this various explanations have been offered, such as that the nerves act like a bell rope, or that a liquid in them is set to vibration or that a substance in the nerves is burned up like a fuse.

NERVE-MOTOR UNITS

Having become acquainted with the different physical parts of the Central Nervous System we will now see how these different parts cooperate in piano playing, assuming that our player is a beginner. In the working of the central nervous system three distinct actions are noticeable:

(*a*) *Stimulus*
(*b*) *Reaction*
(*c*) *Discharge*

A stimulus is the action of an external force which brings about a change known as nervous impulse. In a player's brain this stimulus is the note on the paper; the reaction is the changing of this into energy which, as a discharge, goes over the arm nerves into the muscles. This triple process is enacted so rapidly that when, for instance, we touch a hot object we withdraw the fingers and cry out. The three actions appear as one yet several trips have been made over several nerves and to several muscle centers.

This circular route from mind to muscle and back again is made every time, whether the action is really carried out or not for "all states of mind, even mere

thoughts and feelings, are motor (prompt motion) in consequence or are followed by motor activity" (James). The seeing of the note on the paper (sensation) is not necessarily followed by the actual playing of it on an instrument, yet it will be almost impossible for a trained piano player to refrain from going through the proper action (or playing of it) in his mind. In other words, when the discharge has followed the sensation and reaction a special supply of blood has been sent to the proper muscle, which has gone through the process of contracting and is benefited by the training; it was what we call an act of practising.

The closest connection exists between sensation and motion, and between thought and action. When such connections have once been established they remain united for life time, for the nerve cells as well as the muscular tissue have the power to retain and to revive former activities. "Nothing that enters the mind is really ever lost" (Dr. Pierre Janet). Not only can such unions between mind and motion be recalled voluntarily at any time, but they will even appear involuntarily. All that is necessary is that the stimulus be the same; the reaction and the discharge will follow automatically.

Such established connections are called nerve-motor units, or nerve-motor processes. They are formed whether they are correct or incorrect; the wrong connection remains just as faithfully registered as the right one, for the physical process is always the same; only strength and duration are changeable and different in each different action.

Practising is forming nerve-motor units. A measure once practised wrongly is a combination of wrong nerve-motor units; and these will ALWAYS appear as wrong whenever recalled. If it has been practised right the correct version will appear. Neither nerve cell nor muscle know what is right or wrong, for they can act only according to the stimulus received.

Every musical phrase demands execution, either real or imaginary. Every technical phrase represents a collection or sequence of single nerve-motor units, combined to larger and ever larger units. All forms of fundamental piano technic, scales, arpeggios, etc., represent nerve-motor units. Once established correctly these will always be at the player's disposal. The more of such nerve-motor units a player has established the more accomplished he will be.

Silent Practice

The greatest obstacle to the progress of children is the inability to concentrate, to fix their attention for any length of time, with the result that the forming of *correct* nerve-motor units is often very difficult, if not impossible. Again the "ear" too often assumes the leadership in prompting the fingers; so long as the music does not sound absolutely bad or inharmonious it is all right and passes.

For all these evils silent practice forms an excellent remedy. Above all it promotes concentration, for the "human mind is no man's fool!" It is said that Paganini practised most of the time silently. Mischa Elman, asked about his method of practising, said that when he came to an extremely troublesome place, he stopped actual playing, and thought phrasing, fingering and bowing out; then he resumed practice and always mastered the place in shorter time.

Fifteen minutes of silent practice will make a deeper, clearer and more lasting impression upon mind and muscle than an hour of sounding the keys. The benefit is due to the fact that the combinations (nerve-motor units) formed with a mind fully concentrated upon the matter and not lured away by the seductive sound of music are correct and can never be erased. Students who spend time in trains and cars can make excellent use of silent practice. For those who are skeptical I recommend the following little experiment: Hold your arm out straight, imagining that you have a revolver

in your hand, and act as if you were aiming. Then pull the imaginary trigger in your mind but without moving the second finger. You will feel the motion without having really made it.

Scientifically this fact is proved by an experiment with a plethysmograph. This instrument consists of a glass tube filled with water, in which the arm is inserted. This registers every swelling of the arm, and shows an increase of blood supply, resulting from contracting a muscle in an imaginary action as well as when the action is carried out in space. The benefit of silent practice therefore is physically the same and from an efficiency point, superior. For it is not interfered with by other sensations, and therefore makes a clearer and more lasting impression. The Virgil Clavier or any other silent keyboard is especially adapted for this purpose. See *"My System of Practising Violin and Piano,"* by Goby Eberhardt, Dresden, 1907. 2 vols. (Carl Fischer).

The Senses

Perceptions

"Our senses are the doors through which the outside world enters into our consciousness," and every second of life, anything which stimulates the senses, ear, eye or skin, is reported to the different nerve centers providing the nerves, the means of communication, are in healthy working condition.

Such a sensation is called a perception if it is strong enough to be noticed; for, fortunately, we do not become conscious of all sensations entering the brain. Should this perception arouse other previously experienced and conserved perceptions and associate itself with them we then experience an apperception.

Sensation is a purely physical process, perception one of consciousness and attention, and apperception one of memory and consequently of knowledge and education.

Suppose that a child who has never been taught music is shown a staff with a note upon it. According to its limited experience this note will be a round black spot and the staff will be five lines. In the child's mind this might become associated with the image of a fence, something he has seen before. The process could go no further until he has been told that this black spot is the symbol of a tone which corresponds with a certain key, and that whenever such a black spot is found on another line it represents a different tone and a different key. Whenever such arrangement is again presented to the eye the mere sensation upon the physical organ will profit by the before mentioned

brain process and experience (education, knowledge) and hereafter it will always be "notes" and a "staff" and furthermore "key and tone." Associations have been formed which remain inseparable forever, the sensation has become an idea, and the child has learned to discriminate between "dots."

It can easily be seen now how very important it is that every presentation made to a child should be clear and correct, that it should be made in such a way that it will impress him and become "settled" before other perceptions are formed. The teaching of the notes to a beginner cannot be done carefully enough. Never should a new staff be taken up before the notes of the first are absolutely established, so that whatever may enter afterward cannot blur the first perception.

Playing and reading from the staff must never be attempted together until each matter is firmly settled, until the notes are absolutely known, and the rudimentary playing motions are equally well established. Although the mind of a child absorbs the outer world with phenomenal eagerness and rapidity it is not able to attend to two matters such as notes and keyboard, reading and moving, at once. One will suffer in the best case, and both suffer in most cases.

Attached to poor education is a chain and ball which it must drag along, which it does not dare to cast off; and that is tradition. "Thus it was done for years and so we continue to do it." For years the child has learned the treble staff first and played it afterward with his right hand. But when he begins to play from two staffs he is told to read the lower staff first. This is well and good, so long as both hands are playing in the treble clef. But when the bass clef is taken up the trouble begins and perceptions are blurred. It is the old-time process that is responsible for the trouble! The first notes learned were treble clef notes. But now, when the pupil must read from different clefs, he must read the bass clef first; thus it comes about that the treble clef, associated with first reading of

notes, will make the reading of the bass notes very difficult for quite a while.

Therefore the bass clef should always be taught first and the other afterward. It does not make any difference whether the treble clef is represented as an independent clef or, as some advocate, as a continuation of the bass clef. By teaching the bass clef first another point is gained which is that an added importance is given to the bass: It becomes the real basis upon which the other part of the music rests. Children cannot reason voluntarily. Their conclusions are arrived at only by association.

The right side is always more important to children than the left, for they do everything with the right hand, which thus gains a particular superiority in the child's mind. The left is secondary and is gradually slighted; and what is of less importance to a child is also of less interest, GETS LESS ATTENTION and is neglected. So the bass always suffers. It is rarely learned well, and it is not practised well. Nine-tenths of all amateur players cannot read or play the bass notes correctly for the above reasons.

"Blind Sight"

Whatever is presented to the outside stations of the central nervous system is reported correctly inside. It cannot be otherwise unless an abnormal state exists. The eye either "sees" correctly or not at all or, in case of weakness, in a blurred manner. It is impossible for the physical eye to transmit to its nerve-center a different image from that presented to its outside focus. But it can happen and too often does, that the inner eye "sees" differently from the physical eye. Then we meet with so called "blind sight."

The combination g#-b#-d-f on the staff can never produce the picture of g#-b-d-f upon the physical eye, yet many players will read g#-b-d-f and why? The mistake is made when this particular "seeing sensation" enters the brain. Here it meets many others

which have entered before and already have established associations.

All the combinations which have ever been experienced in connection with a four tone G-chord come forward, unless prevented by attention from doing so. The physical eye acts ("sees") quickly, and the mind also perceives quickly. Often but a little suggestion is necessary and the associations will supply the rest. We do not read every letter of a word; one or two, yes, even the general appearance of a word is often sufficient. It has already been registered and the slightest suggestion will produce it upon the screen. I am frequently attracted in newspaper advertisements by the word "concrete" which at first glance I take for "concert"; no doubt a highway and building contractor will occasionally have the same experience with the word "concert."

"Every perception is an acquired perception." As with words so it is with chords and all musical or technical combinations. One note, two notes, yes, even the mere typographical appearance is sufficient to bring a whole combination into the foreground. This is one of the reasons why so many mistakes are made in reading music and why in these mistakes the familiar, the known, will appear instead of the strange, the unknown. G♯-b-d-f is played instead of g♯-b♯-d-f because one is found often, the other seldom, in music.

The experienced teacher will know of many chords that are ALWAYS played wrong, except by very careful or by totally blind pupils who "see" with that enormously developed touch of the fingertips as these glide over the raised notation. The blind player reads note for note for he must feel each single one. Therefore, to the shame of the pupil who sees, he reads more correctly and hardly ever makes mistakes.

The quicker the perception of the pupil, the more such mistakes will he make. In such cases the fault is not due to inability to read the notes correctly, for in most cases half the notes are not "read" at all. It

is sub-conscious guessing. The remedies are not note-reading and four-hand playing at the piano but concentration exercises and slow, conscious playing. This will be treated again in the chapter on Attention.

Seeing and Hearing

The ability to hear is due to the auditory organ which consists of the external visible ear, the middle ear, and the inner ear. This whole organism (whose interesting mechanism can be studied in Martin: *The Human Body*) is the transmission-station for the delivery of all air vibrations to the auditory center where they become sound-perceptions. Through associated processes they become a part of our experience, knowledge or education, ready to form again associations with newcomers. The *modus operandi* of the eye is the same in principle.

Of the two organs, eye and ear, the ear acts more directly as a factor of education, while the eye assists us more in a secondary way through reading of printed matter. As the eye is used more consciously and constantly it is also better trained. In learning to play piano or new music later on the eye is the main sense, paradoxically as it may sound, for the eye must first find out what the ear is going to hear; the ear is unfortunately a Cinderella that is attended to only in a secondary way. As if resenting this it often puts grave obstacles in the way of the teacher and pupils by unchecked and careless activity. The eye has the advantage of lengthening the duration of any stimulus almost at will while the ear, with the temporary character of the general sound, has often only but an instant for making a record of it.

The eye may rest upon a painting or a printed page for hours and take in every detail. In listening to a musical composition the new tone often follows the previous one almost before we have become conscious of it. Again the eye may take in a whole painting or musical phrase at once in its total, but the ear must

almost recreate a composition in hearing. While it builds up new columns of tones the former are already ruins of memory. It is therefore not strange that if, in spite of this advantage of the eye, visible impressions become twisted in the mind, the same should happen to auditory sensations.

The less musical, the less intelligent the pupil is the more slowly his gray matter will move, the more he must depend upon his eye for learning, and the longer he will be obliged to look at his musical problems. The more musical a pupil is and the quicker perception he has, the more he will dispense with the accurate eye and depend upon his "ear" or inner sense of hearing. One glance at a phrase, one playing of it is often sufficient to allow the ear to take the lead, thereafter. But too often it is a leader not implicitly to be trusted unless it has been trained very carefully to listen conscientiously.

All public schools have ear training lessons, yet these do not seem to be of any advantage whatever to the music teacher and his pupils. The wrong conception of one sense can never be corrected by another; there will always be a discrepancy between the two. Still less useful is the mechanical ear training in which intervals are measured as with a yardstick, as is the case in some of the public school methods in use.

The only ear training that really is useful to a piano student is ear training for beauty and quality of tone. In this case the sense of hearing does not coincide with the sense of seeing but with the muscular sense; these two are the real music producing senses in piano playing. The eye is not the organ of anticipation in touch in piano playing, but the inner ear. The eye commands *what* is to be played and *where* it is to be done, but the ear decides HOW it should be done. The eye for the painter, the ear for the musician.

The sense of hearing does not correspond with the sense of seeing when it comes to actual playing but connects itself with the muscular sense upon which it

depends for the realization of the effects anticipated. The ear therefore is the true *musical* sense. The eye is the *technical* sense. In the beginning the eye trains arm, hand and fingers in reaching for and locating the keys. It teaches the pupil to aim correctly and is therefore a most important sense in the beginning. IN ALL MOTIONS THE RESULT, THE PURPOSE, IS THE MOST IMPORTANT PRINCIPLE.

The education of the ear for beauty of tone, for the appreciation of the pure sensuous pleasure of listening and drinking in beautiful sound and through this learning to appreciate the stronger character of the dissonances, is far more important than the education of relative pitch. In itself this means but little to the piano player, although it is everything to the singer, who himself produces the tone wanted and to the violinist, who must regulate the acoustic properties of his instrument. The true enjoyment of music is, after all, sub-conscious. The moment that the intellect assumes too much part in it the senses are pushed into the background and reasoning and thinking assume control.

To a certain extent the ear is a tramp among the senses. As a lazy tramp does not care whither he is drifting but enjoys the sun, the fields, the woods and meadows whether they are his or Smith's so long as he can lie there and loaf and dream, so the average ear drinks in the sounds luxuriously and then sends them farther to find companions of sorrow or joy of long ago.

Instil in the child the love for beautiful sound, for the quality of beautiful sound, get it disgusted with that which is cheap, noisy, vulgar. That is all the ear training really needed. This ear training will produce the most joy in later life and will be an important factor in the musical development of our country. If a child can enjoy good tone, loves good music and longs to produce it, it does not make a bit of difference, whether he can recognize an augmented fifth chord as

such or not. The country is beautiful to him who has the eye beautiful; what it is composed of may be left to the geologist and the chemist; a Beethoven symphony, a Chopin nocturne is beautiful to him who has the ear beautiful, what the intervals are may be left to the teacher of theory and analysis.

In order to understand, to teach music, these things are absolutely necessary. But they are not essential for the pure enjoyment of music, and in the teaching of children the appreciation of tone beauty must be the first and principal matter to be accomplished. It is the creator of interest and attention with the whole train of necessary servants that are indispensable in the process of education. But this will never be accomplished by raising one finger after the other within the compass of five tones for two months. There is no music to that, nor is interest to be found in it.

Action

(PRACTISING)

Muscular Sense

In the primitive state of mankind it was the senses of seeing and hearing which prepared him for contact with objects of the surrounding world. This application of seeing we can observe in an infant who, as soon as it sees an object, reaches for it. We ourselves turn the head in the direction of any sudden sound; hearing, as well as seeing, prompts motor expressions or motions.

Both eye and ear are the educators of the motor centers, for which reason an understanding of this wonderful cooperation between mind and motion is of the greatest assistance to the piano teacher. Not alone is all shading in the artistic performance of the finished virtuoso due to these subtle connections and are guided and controlled by them, but also the very first clumsy attempts of the beginner.

Piano playing is finally nothing but the absolute control of the muscular, motor and touch senses. Piano teaching is finally nothing but the stimulation and teaching of this control and the recognition of this by the pupil through instruction.

Practising is the training and education of these senses through observation by the player himself.

Specific pianistic talent which, in its most mechanical quality a person may possess without being really musical, is the natural development of these senses to

a high degree of efficiency and an advantageous association of them with the player's feelings and emotional states. Yet in spite of their importance these senses act so delicately that they very seldom burden the consciousness, and we do not experience the process which brings about motion; we can only recognize them by the result and the accomplished fact.

This is most conclusively shown in muscular contraction: Hold the muscles for a long time in one position. We hardly feel that they get stiffer and stiffer until finally, when all bound up in a cramp and unable to move any more, we become aware of it. The gradual change escaped our consciousness; but we took notice when the intended motion which was the end, the purpose of the initial condition could not be carried out.

The *muscular sense* keeps the mind informed of the condition of the muscular tissue, the respective position of arm, hand, and fingers, of any change of position, no matter how slight, and of any degree of contraction, no matter how small. The motor impulses issued from the brain to the muscles and the control of the muscles through the mind is all there is physically to piano playing, no matter what kind of touch a pianist may prefer or what part of his playing apparatus, arm, hand or fingers, does the actual playing or produces the tone.

The *muscular sense proper* regulates the amount of contraction necessary to overcome the resistance of the piano key; it demonstrates itself chiefly in downward motions into the key. The *motor sense* demonstrates itself chiefly sidewise in finding the keys, in moving the hand over the keyboard from key to key. *The sense of touch,* finally, is the controlling sense, the one which reports the executed motion. All these senses become educated through practice and possess the power to retain impressions; they associate themselves easily with other sensations, perceptions and feelings, and once these associations are established

they are conserved to be recalled instantly should some path lead to them and start the process over again (nerve-motor units).

A splendid experiment to explain the working of muscular sense to pupils is the following: Let a pupil take up two different objects, one rather heavy, the other very light and then change them from hand to hand. The teacher is to call attention to the fact that through the assistance of the eye the muscles have learned to anticipate the effort necessary and to prepare for it. Then blindfold the pupil and again name the objects, as they are given to him, to hold in the right or left hand. The knowledge previously acquired will again prepare the respective muscles for either object. Now comes the test. Tell the pupil to hold the light object in the right hand and then give him instead the heavy one. The object will drop to the floor because the muscles of arm and hand are not prepared for the necessary stronger effort.

Piano playing is a constant change between contraction and relaxation of muscles to such a fine degree that it is almost impossible to believe that so many changes can be accomplished in such quick succession. Yet the beauty of piano playing and of all musical performances lies in these constant delicate changes and differentiations of tone values, this constant increase and decrease, this continuous ebb and flow of infinitesimal nuances as the uprising and subsiding of the performer's emotions and intellect prompt. It would be almost impossible for a piano player to free his muscular sense to such an extent from all with which it is associated, that he could play a whole composition from beginning to end with equal tone value. To do so would require a control of mental and muscular faculties almost superhuman.

The so-called marks of expression are but signals to the muscular sense, because to observe them with the eye means to follow them with appropriate muscular effort. If they do not make themselves felt it is for

three different reasons: (1) It may be that the pupil is so much occupied with the reading of the music, the "getting" proper, that he has no attention left to observe the marks of expression. (2) He may see them well enough but has not sufficient control over himself to connect them with his muscular sense, to enact them. (3) He has not learned how to change his muscular states from one to another. It is all very well for the teacher to say "play *forte*" or "play *piano*" but how many can tell the pupil WHAT HE MUST DO IN ORDER to play *forte* or *piano*. Correct muscular attitude is everything in piano playing. Each effect requires so much; it is a case of the proper dose; a little more, a little less and the effect suffers. No effect is without cause. Change the cause and the effect is changed.

Why not tell a pupil that if he uses a certain part of his arm it will produce so much; if he contracts a certain part he will get a corresponding value? Train him thus to observe himself and to know whether his muscles meet the demand of his will and emotions. In teaching piano playing there are, at first, but two forces to train, the mind to absorb the theoretical material, the body properly to execute the motions. Therefore the teacher should watch the body of the pupil all the time most carefully and should train the pupil to do the same for himself. Hard and soft touch, good or bad tone, in the last analysis, are matters of the muscular sense, and this is but a delicate feeling for the applying of the proper "dose" of strength and speed of motion. Only when the cooperation between the playing apparatus of the player (his body) and the mechanism of the piano is thus harmoniously adjusted can we hope for the best results. The reason that so few of the great numbers of pupils can play well lies in the fact that because of an uneducated muscular sense, emotional or intellectual control of effort is absent. This is not the fault of the pupils but in the majority of cases of the teachers.

In every day life this education of the muscular sense is due to the knowledge acquired through the eye. In piano playing it is regulated by the inner ear which must anticipate the quality and quantity of effort before the effort is delivered to the key and the tone produced.

The education of this ability, this anticipation, comes through conscious experience, and is facilitated by the ability to retain muscular efforts once used in the proper quantity, not simply to keep it forever associated with such actions, but allow it to be made use of in others. If it were not for this ability all teaching would be useless and practising would be impossible. But because we have this ability we can store up our muscular experiences and draw upon them whenever the same or similar cases call for the same effort and effect. As we increase the store of these muscular experiences in the pupil we gradually make a piano player out of him, one who knows how to use himself and the keyboard. Again it is the lack of control of this sense which makes the efforts of the beginner so clumsy and his playing so monotonous, especially when he is also wrongly instructed and forced to do things that are practically impossible to be done easily, naturally and gracefully.

The muscular sense is further demonstrated in the change of position and location of the arm and its different parts. In this specific capacity it is often called *motor sense,* because directly connected with motions, which are changes in space of the position of our members.

Piano playing is motion. If we cease moving we cease playing. It is a continuous moving of one or both hands from one place on the keyboard to another, in constantly changing distances, from that of close and neighboring intervals, covered by the five fingers in one hand position, to octaves and even larger stretches and wide skips reached only by movements of the arms. Therefore, we repeat: Piano playing is motion.

The efforts of the *muscular* sense are recognizable only by the ear through quantity of tone, and touch, or through change of conditions in the ligaments. The *motor* sense is guided entirely by the eye in the beginning until it can dispense with it through practice.

Superior piano technic, a feeling of being "at home" on the keyboard, means the complete mastering of this motor sense. For instance the ability of the player to play correctly on the keyboard, with his eyes constantly on the music sheet, is due to this sense only. The education of this sense must begin at the first lesson, and it must be trained by aiding and helping it until it can act alone. If a beginner is allowed to play "from notes" during the first lessons this sense will never be educated correctly.

The *feeling for distance* is acquired at first by the *seeing* of distance; the pupil must have the distance in his mind before it can get into the fingers. He must learn to aim at it, with the arm, hand and fingers. The end and aim of all motion is the final purpose of the will power. The motion itself and its mechanical apparatus never enter the consciousness. If a beginner must observe notes and keyboard at once it will lead to that constant moving of the head up and down, from notes to keyboard; there will come a time when the whole progress of the pupil will stop. In the case of advanced pupils who cannot play without looking at every motion of the arm the remedy is to play with keyboard covered for a while.

As in the case with the muscular so the motor experiences associate themselves with others, and such experiences once gained become subject to recall. If one would construct a keyboard with keys only a shade wider or narrower it would be impossible for a good pianist to use it on account of the difference in distances. On the violin the education of the motor sense is of far greater importance, for here *"distance is tone"* and the slightest deviation in the placing of the fingers means a change of pitch. Of course in

piano playing both muscular and motor senses are always associated; yet while one cannot work without the assistance of the other, the first is after all superior.

Quality and quantity of tone are directly under the control of the feeling; they are emotional demonstrations. All dynamic changes are directly a matter of either artistic taste (objective) or musical feeling (subjective) while the striking of the key proper (covering of distances) is more a mere mechanical and strictly technical matter. This is proved daily by piano players who have an unfailing, thoroughly reliable technic (applied motor sense) but are unable to shade tones and are unable to make one feel that there is any emotional life or, if there is, that it is in any way connected with their performance (lack of applied muscular sense). On the other hand a piano player may play with great intensity of feeling and variety of tone shades (applied muscular sense) yet frequently miss the right keys (lack of motor sense). The motor sense degenerates through lack of practice, the muscular never does so long as the emotional life of the player does not undergo radical changes.

Lack of practice for a long time (during summer) therefore makes itself felt mostly in lost control of the motor sense, in a feeling of uncertainty on the keyboard, and this again proves that the motor sense is inferior and mechanical. A certain quality and quantity of tone once connected with or acquired through an emotional state will never be lost and will appear unerringly so soon as one of the factors responsible for it reappears and the suggestion is strong enough to awaken the other. Motor sense efficiency is the result of practice, muscular sense, of inborn feeling.

Sense of Touch

The surface of the body, the so-called periphery, is supplied with innumerable little organs known as touch elements, connected through nerve fibers with

the central nervous system which is thus informed when any part of the body comes in contact with an outside object or material. Pure tactile sensations are very rare, because all are generally connected with other sensations such, for instance, as muscular, whenever pressure is concerned, and motor, when we try to find shape and form of the objects; and there are also sensations of temperature. Touching an object means physically a compression of the skin alone, when applied lightly, and a complete change in the condition of the joints and ligaments in all greater efforts (articulation).

As we are not conscious of the processes in the brain, but can only observe the accomplished fact of such processes through motions, it is due to the sense of touch that we become conscious of what we do on the keyboard. The sense of touch, therefore, acts as an auxiliary to the eye in the location of keys and to the ear in quality and quantity, and completes the circle of action in tone production by registering the effort and its nature.

The indispensability of this sense is easily proved by covering the finger tips with collodium. This leaves the most efficient piano player practically helpless on the keyboard.

Much harm is and has been done to piano teaching by the use of the word "touch." Language is the expedient of necessity. Words are coined because we need them for the expression of certain ideas; some languages have no words for certain ideas which may be found in the languages of other races and nations. The German language has no Germanic word for "sport," English none for *"Gemuth"*; neither has an equivalent in one word for the French attribute *"esprit."* Certain words are so closely connected with certain ideas, so closely linked together, that every time we use such a word wrongly, "out of place," the true original meaning will always suggest itself and blur the idea. We connect with the word "touch" a

very slight effort, almost no effort at all; when we refer to touch of key as meaning "playing" the word is utterly out of place. Mere "touch" alone will never produce a tone; therefore the sense of touch, as a direct working tone-producing sense, is the least important of the three in actual tone production.

Yet in the wider and broader sense it is the most important of all, for it is responsible for the storing up of experiences in quantity and quality, the true musical properties of playing. It is most important that this is well understood in teaching. Touch cannot be taught; it can only be observed. What can and must be taught is control of muscular sense, for that does not exist at all in the consciousness of the beginner, and must therefore be first awakened, then cultivated and developed. The pupil can take care of the motor features alone, which are but subject to faithful mechanical repetition. He will soon know himself whether he strikes the right key or not and can correct himself.

Piano touch is a combination of the three senses; yes, it is still more. It is the absolute amalgamation of muscular, motor and tactile senses plus one's experience, plus all one has heard about it, plus all one knows about it, plus all one can imagine, and plus all that one's mind and fancy is able to absorb and again to express—one's joys and sorrows. All this cannot be taught but must be felt. But most of these matters do not enter into the playing of the beginner. Here it is still but a psycho-physical process, that to a certain extent can be analyzed, explained and taught. It is an exchange of physical and mental forces, a delicate give and take that can be gradually developed from crudeness to greatest perfection and be made a faithful and willing servant to the pupil.

It is one of the mysteries of nature, the entire solution of which is not given to man. But we may approach it as nearly as we can, may form our own conclusions and try to explain it in our own crude way.

In his conversations with Eckerman, Goethe touches this point most beautifully; "I will tell you something which you may use in your life. There are things in nature that can and that cannot be approached. This, you should bear in mind and respect it. It will help quite a little if we know of the existence of such matters, although it will always remain very difficult to say where one stops and the other commences. Whoever does not see this may trouble himself all his life long to solve the insolvable and never will reach the final truth. Nature always holds something problematical for itself which the human faculty is not sufficient to explore thoroughly." Yet there is a certain physical possible control of these three senses. The initial *conscious application* of it is the basis of all PIANO TEACHING; the final *unconscious application* is the basis of all PIANO PLAYING.

All our efforts are first but experiments. Even in the first steps the little baby applies the motor sense, although so crudely that it often leads to a demonstration of the sense of touch not expected or wanted; but constant repetition, prompted by observation and experience, will soon change the awkwardness into skill and natural grace we so much admire in children. This is so with all acquired motions and faculties, and piano playing is one of them.

ACTION

An action is the result of a motor response to an idea or sense impression. When such an impression or idea is always followed by the same motion and this process is repeated frequently we contract a habit. When, for instance, the idea of playing e-g-c-e is always carried out with the fingering 1-2-4-5 in the right hand, when I associate the sequence of the diatonic scale of E with a certain fingering, I am forming a habit in regard to that key and finger combination. The final aim of all motor training is the forming of habits or the acquisition of skill.

The cause of all voluntary muscular action is the innervation of their tissue by way of the nerve trunks under the force of the will (*voluntas*). When a child perceives a note for the first time and "wills" to play it, he acts under the full control of his will and such action is termed a *voluntary action.* Two different kinds of action are performed by the muscles: instinctive actions that are inherited and grow out of natural desires, due to our process of living; and acquired actions, which have nothing to do with our process of life, as for instance that of piano playing.

The development of both kinds moves in opposite directions. Instinctive actions are first reflex actions made in response to certain impulses and only gradually come under the control of the will power, and then are governed by inhibition. Acquired actions are first voluntary and only later on develop into reflex actions performed without much or any assistance of will power through practice and education. All actions performed on the piano for the first time are voluntary actions, new actions, in which mind and muscle obey the will power, although under considerable protest and friction. This is due to the great difference between the ease with which we take possession of an idea and the difficulty of its execution through the muscles. The feeling of unpleasantness, of discomfort and clumsiness connected with so-called first efforts is due to the consciousness of not being able to carry out our ideas as well and as quickly as we wish to. It is also a feeling of impatience with ourselves, and often leads to the employment of unnecessary energy due to eagerness, a condition ultimately harmful to the effect proper.

Although such first action may be slow and clumsy, yet the principal point is that it is made with full consciousness and leaves an impression upon the mind according to the strength of the stimulus that prompted it. This again is governed by the amount of interest and attention bestowed upon it by the acting

person. If this action is never repeated it remains an isolated action and will be pushed immediately into the background (sub-consciousness) perhaps never to appear again. Single presentations and actions are very seldom lasting. They seem barely to get to the door, never passing the threshold into the inner mind which only repeated actions will cross, to be registered and conserved for future use.

The whole process may be illustrated by looking into the word "habit" and its root. To have something is to possess it; it has become one's own. Habitation is a place where one is staying for good, where one is settled. A man is not settled in an inn where he stays over night only; the Frenchman speaks of his clothes as *l'habit,* that in which he lives.

An action is the result of a stimulus and stands in direct proportion to it; it takes quite a strong stimulus to prompt it. A slight noise will hardly arouse the attention, although frequent repetitions of it will. One occurrence may also have the same result when increased sufficiently in strength.

Semi-voluntary Action

When a stimulus or a sensation enters the mind it is not transferred directly to the motor centers but first "switched over" to other centers. Here the irritation is conserved to be made use of again either for the same purposes or for others than the one with which it was originally connected.

It is due to these interpolated nerve fibers and cells that every action, if repeated exactly in the same way, must become easier and can rely upon previous experiences more than upon will power and intellect.

There are many opinions in regard to the working of the mind, so far as conserving of experiences goes. It has been compared to a storehouse full of experiences and knowledge. It is supposed to be plastic and easily modeled through work upon and with it, or different cells are supposed to discharge one into the

other, and so forth. What we know is that all nerve cells are connected with each other or influence each other. Therefore we assume that in a sequence of actions such as those used in playing a scale, the actions travel over nerve fibers which form the means of communication (nerve paths) between different nerve cells that are active.

We may illustrate this with the idea of forcing a way in a virgin forest through which we wish to make a short cut for home. At first it will be hard going, for much growth is to be cleared away. So in playing we are forming new nerve-motor units which must be strung together, which must be practised in order to serve us again. But the benefit from this process will be gained only if each repetition is always and absolutely the same action, performed on the same key, with the same fingering. Every time, then, that the repetition takes place, every time the road, the path, which leads from cell to cell, from motion to motion, or from mind to muscle, is traveled it becomes smoother. Every repetition needs less will power, less brain work in the same ratio as it profits by the experience of the former and as the different actions follow each other more quickly and more smoothly. This is the reason for the insistence upon careful practice.

In the scale of E, each note at first prompted the use of a new key, a new finger. On $g^{\#}$ an entire new hand position was to be added, the hand had to be moved three keys further in order to cover eight keys with five fingers. Under the impulse of semi-voluntary action the first section of the scale, e-$f^{\#}$-$g^{\#}$, soon formed one unit and so did the rest from a to e, soon it will be only necessary to stop on $g^{\#}$. The road through the brush has been cleared perceptibly. We have still a little trouble in one place to find our way in the dark. A rock causes us to stumble! Sometimes we guess the distance right; again we miss it and a stubbed toe reminds us painfully and with emphasis that we have not quite mastered it all.

But continued traveling, the continued repetition, will change all that. Soon the motor centers are adjusted through this constant repetition (practice) so that it needs only a suggestion and the player starts from E with the idea of playing the scale of E, and it is played smoothly. Eight single voluntary motions or actions have become one action, are made automatically, mechanically; in other words, they have become REFLEX. This is the goal toward which concentrated practice has tended.

REFLEX ACTION

A natural reflex action is an action which follows a stimulus immediately. It is unsuppressible, unavoidable, and made without the slightest assistance of the brain or will. All functional motions are reflex actions. For instance, a speck of dust gets into the eye and immediately a gland filled with a liquid is opened to wash out the cause of disturbance; something gets into the throat and we cough. We *must* act thus, whether we want to or not; we look into a mirror or a placid pond, and an image is immediately reflected automatically.

Practising is nothing else than the changing of voluntary action into reflex actions. All piano technic *must* become reflex and *will* become reflex when repeated and practised correctly. As we go along we gradually select, from the many muscular groups that at first have been active, those which we must use absolutely; and we gradually drop those which are only an obstruction. The paths become more and more direct; there is less losing of effort in by-paths, the amount of actual labor becomes less, and consciousness is dispensed with gradually as the work is done more and more unconsciously. It has become a habit to do a certain act this way, and *only* this way, and the combination reels off with clocklike precision, one action changing into the other, easily, smoothly and without the waste of a single unnecessary effort.

We have acquired the skill to play a particular technical phrase. But SKILL IS AUTOMATIC ACTION AND ABOVE ALL THE ELIMINATION OF UNNECESSARY MOTIONS AND EFFORT.

Time Sense and Playing Before Pupils

The peculiar trick of "blindsight" is but a consequence of habit. We used to see a thing one way. Whenever such objects appear again the mind holds up the familiar pictures minus the individual change, and we notice our mistake only when we look closely. Often we keep on hearing certain noises or tones, or retain feelings after they have actually ceased. Many persons know the uncomfortable feeling, after having been on a sailboat for a day or two, of not being able to get rid of the swaying motion when on land.

The tremendous force of habit can easily be demonstrated by negative processes. We all know the alphabet; suggest to a class the alphabet and say A and immediately in all minds A will discharge into B, B into C, and so on. These letters have been associated with each other so often that the tongue is instantly ready to pronounce the next letter. But now let the alphabet be said backward and there will be trouble. It is the same with scales, chords and all fundamental technic. Let a scale be played with a different finger, or a strange sharp introduced into the scale of C, as for instance in Beethoven's first concerto and there will be trouble at once to the inexperienced. Starte *Home, sweet home* or *My country, 'tis of thee,* with a children's class and then stop the actual physical singing. The children will finish the whole first period in their minds just the same, for when once a melody has taken lodging in our minds it will come to the door upon the slightest invitation or hint.

For the forming of technical habits carefulness is necessary and they can be established only by slow practice at first. The first step is to play a page or a line or a measure once with absolute correctness.

It is on account of the inability to do this that many talented pupils never really develop into first-class and reliable players. To them music is like the beautiful *Lorelei* that lures them on with the charm of melody, with the mystery of the harmony, with the untamed desire to do the thing at once, "at all cost, at all losses." With such pupils the musical ear is the real obstacle, although it should really be their most efficient helpmate.

Pupils, and above all, children who are really interested in their music, greet each new selection, each new study with tremendous interest and want to know how it sounds. "Please play it for me," they say. The teacher who has insight into the wonders of the mind, who knows what a faithful and fearful servant it is, who knows that when once given an impression it will hang on tenaciously and retain that impression, will not comply with the pupil's wish. Perhaps he has explained these matters to his pupils and they know the reason, perhaps he has not. But at any rate, for the sake of seeing his pupil learn this piece correctly, he should not play it for the pupil until it is ready for the finishing touches, until it has been mastered technically.

The reason for this is obvious. In playing a composition at rapid speed, the pupil's ear carries with it this fast impression. The temporary impression of the different notes, as they follow each other is immediately registered. Hereafter the pupil can hear this piece only "fast." As soon as he comes home to practise, the ear prompts "fast" and the damage is done. It is far more advisable and really profitable to play the new lesson slowly, for then the ear will not play any tricks through habits acquired quickly in the lesson. The time sense that registers the lapse of time intervals is most accurate and faithful. If it were not the rhythmical sense in man and beast would never have assumed such an importance. But this sense works not consciously but subconsciously, and registers the lapse of time whether we pay attention to it or not. So

when a certain finger has become accustomed to move at a certain rate it will unconsciously do so.

The influence of the time or rhythmical sense is of enormous power. Every teacher is familiar with pupils who have only one speed, to which they have become accustomed, one that nothing will change. Let such a pupil start a composition as slowly as possible and take the rate with the metronome. Soon he will go faster until he has reached a certain speed—his speed. This he will then keep, not faster, not slower. He always reminds me of a country horse, old family Dobbin, that makes the rounds from farm to post office and store always at the same speed, and has settled down to this one way of traveling the distance. Should somebody else drive him and urge him on faster, he will speed up for about twenty feet, and then fall back again into the same old trot.

With regard to a new composition the mind of a pupil is like a sensitized photo-plate in a camera. It is protected against light until the moment comes that the shutter is opened to receive the picture correctly as it presents itself. But should the slightest ray of light strike it beforehand a spot will appear, and this, of course, will mar the picture to be taken. It is so with the pupil's mind in playing. One wrong finger, one wrong key, and the true picture of the phrase to be played is spoiled. Two different discharges are now connected with it, whereas there should be but one. Two roads lead to two different consequent actions. In case of lack of control, as for instance in the lesson or recital, or under other nervous strain, the wrong road might be followed just as easily as the right. The consequence is that the pupil breaks down.

A pupil must have these matters explained in order to see the folly, the waste and the labor connected with fast practice. It pays the teacher to do this, for, as a rule, most pupils are anxious to progress. They must learn that they can progress only by removing this most serious of obstacles, careless practice.

Another matter which often might puzzle a teacher, one which has its explanation in the forming of habits, is that careless pupils may come to him with an unusually fine lesson and on being praised will say: "Well, I hardly practised any!" At first this seems rather annoying to the teacher, but this "not having practised" is the very reason for the better lesson. Talented pupils who are not careful do better with little practice than with much. We shall look into this more fully in the chapter on Attention.

The working of the mind, the thorough knowledge of how habits are formed, gives to the teacher also an excellent medium to judge whether a pupil has practised or not. Whenever in playing a particular place a pupil repeats a mistake, he has practised and the mistake is due to oversight in practising. But when the same place reappears and the same mistake is not made again then the pupil has not practised, has not formed habits.

"The mind is no man's fool" and no man can fool it. Unless constantly under the most rigid control it will give its owner away; for it can act only by instinct or by habit. All our learning and all our practising for the attainment of skill is a matter of habit, of voluntary actions which are changed into semi-reflex and finally into reflex. We know by experience what motions we have made upon responding to certain impulses, and these actions have left traces behind of the work performed, to be made use of again when necessity requires.

Pedagogic Psychology

V

Association of Ideas and Memory

The common idea about memory is that it is a separate organ or a separate part of the brain in which experiences we have lived, pictures we have seen, thoughts we have had, knowledge we have acquired are stored away for further reference. Whenever we want to make use of them we go to this "corporeal chamber of records" [Quackenboss], roam among the filing boxes and get what we need.

Now the fact is that the very language we use in connection with memory shows that this is wrong. We do not go to some past experience to remember it; a past experience comes to us as memory. We do not remind "it," but "it" reminds us. When we wish somebody else to call up something of the past, we suggest it to him, not he to us.

Memory, therefore, is something not always subject to our control, but far more entirely outside of our control and mostly a matter of sub-consciousness and even unconsciousness. If that were not the case surely we would not allow things to come into consciousness (memory) as occasionally happens, of which we do not particularly wish to be reminded or to remember.

Memory is a function. It is not a fact, it is an action.

It is the inevitable by-product of every sensation that we experience, and not alone of sensations that we realize with full consciousness, but also of sensations and experiences that hardly cross the threshold

of our awareness; yes, even sensations of the most fleeting character, of which we are never aware.

Every sensation enters the brain over certain nerves which are divided up in many fibers (arborization) when entering the brain. The sensation can thus spread to many centers and immediately wake up former sensations which have been conserved. The same result takes place with the motor nerves in the spinal column; where they enter the nerve elements they are also equipped with arborated fibers which function in the same way as those in the nerve centers of the brain; that is, affect many nerve cells.

There is a distinction as to how motions are prompted, made and conserved in animals and human beings. The animal can make a motion for one certain purpose only, which motion is always made for that purpose, never for any other, and cannot be made use of for any other. They are true reflex motions—the direct outcome of a sense stimulation.

It is different with the motions and actions of human beings who can use their instinctive motions for other purposes than the primitive natural one; and, furthermore, can readjust them, combine them in co-ordinated groups for many other purposes than the initial one. This advantage is due to the fact that the irritation which produces the motion passes first through some other nerve elements where it is recorded, registered, and conserved; and this registering and conserving is memory, a function carried out so thoroughly, so completely that we must assume that every mental and physical action is subject to it and an object for registering and conserving. We have, then, not one memory for all kinds of experiences but really an individual one for each action or activity, one which is simply the perception of everything we sense, think or do. It never is and never can be separated from it, by which not alone individual motions are registered and conserved, but also the endless number of ever varying combinations that we are making daily, and hourly,

(consciously established nerve-motor units, the co-operation of idea and motion). And it is the most important factor in acquiring skill.

To apply this process to piano playing would mean that the round circle we see on the paper enters the brain and becomes a note in the mind by comparing it with previous experiences in this line. But before the idea of the note is realized in an actual motion in playing, it passes on its way from the visual center to the motor center through other cells in which the idea is registered and conserved. If what enters the mind, if what we have learned, if what we have done once could not be retained, registered and conserved, to be recalled and made use of again, we would have to start life over again every morning, and would resemble a child in its helplessness and ignorance.

We must never forget that the memory is not something separated from our activities, something that can be switched off and on like an electric current, but is A VITAL PART OF EVERYTHING WE DO.

Therefore the sub-conscious or the unconscious activity of the memory is far more important and frequent than the conscious one. This subconscious or unconscious memory far more than the conscious one determines our life and our activities.

The only time when we really employ our so-called memory consciously is when we wish to "memorize," an activity which is, in a physiological sense, something entirely different from memory.

Memorizing means to make our mental property something that previously did not belong to our mental stock and was in no way connected with previously acquired knowledge. Memorizing means the gathering in, curbing, and concentrating of this force or function and utilizing it temporarily for a certain purpose by attentive repetition of the material and the impression of such effort upon the different centers to which it addresses itself. And here the special adaptability and individual superiority of different

senses over others are the deciding factors in the choice of the sense, which may be best adapted to accomplish this voluntary registering of matter which is otherwise foreign to the mind.

When we "memorize" literature we either repeat the words aloud or, by going over the lines, we speak them in the mind. In trying to remember a color or lines the artist paints and draws them in his mind. In trying to learn a musical composition we play it unconsciously, even if we are not at the piano at the time, and the sequences of motion are as closely registered as the ideas which promote them; one helps the other in such a delicate and finely adjusted manner in the reproduction of the original material that it is hard to tell where the function of one ceases and that of the other begins.

Piano playing makes use of three senses: seeing, hearing and motor. We find that the predominance of one or the other differs with each student and his disposition; according to the higher development of one or the other ability the student must choose his *modus* of learning, especially when he turns to memorizing.

Hearing is the sense of music *par excellence;* and the more musical a student is, the more will he make use of this sense in learning and memorizing. With him the tone sequences which constitute the melody will prompt him one after the other; his musical ear will be assisted by the tendencies of tones, the natural lead of certain chords in modulatory passages, the compelling power of melodic or harmonic relations, and so forth.

Conversely, highly intellectual development may be found in a student with ordinary or but little developed sense of music. With such a student the reasoning quality, the recognition of the logical sequence of one thing after the other, will be more developed and natural. The logical balancing of the different parts of the form, or the absence of such balance, even the

place on the page, and other entirely esoteric features, which his keen sense of intellectual observation (thinking) notices, will guide him. Not being able to depend upon what the ear prompts he goes by what he sees; he impresses the notes upon his mind until he is able to read the music again from his mind as from an invisible sheet, with his eyes closed,—the visualizing *modus* of memorizing.

But as the sense of hearing in the specially gifted student is always assisted by the sense of seeing to a certain extent, so in the other student the sense of hearing, the ability of the inner psychic ear, is no doubt an assistance to his sense of seeing, only in the lesser degree in each case.

One more sense is active in memorizing, namely, the motor sense. Although constantly connected with ideas as their executive force the motor sense has the ability, finally, to emancipate itself completely from an intellectual activity, and is able to function without the assistance of either will power or mind. Constant physical repetition of certain motions, constant connections of certain motions, constant adherence to the sequence in which certain motions follow each other, will establish motor habits which can be recalled, and will then respond in an entirely mechanical way, and with certainty, without the slightest assistance of mind or will power.

But this muscle, or so-called "finger" memory, belongs already to the co-conscious or sub-conscious memory. That students know the difficult parts of their lessons by heart is because of having practised such passages more frequently. As these have been repeated more often they are retained by the muscle memory, whereas the easier parts, those which have not received so much repetition, are not remembered. But as all reasoning or musical quality is absent, the slightest deviation from the registered complex, such as taking a wrong finger, the accidental striking of a wrong key, may break up the whole combination.

Thus the muscle memory is the least suitable, the least to be depended upon for memorizing purposes, the most dangerous and the most readily upset. But in co-operation with the others it is one of the strongest assistants and absolutely under the full control of will power, or as a sub-conscious consequence of the function of the sense of seeing and hearing.

Memorizing of music is then really a conscious co-operation of the three senses of seeing, hearing, and motor, of which senses the student will instinctively employ the one best suited to his own ability. Often it is necessary that the teacher must find out for the student which of these abilities is the most natural to him, and then stimulate and develop it to its utmost.

BY-PRODUCTS

Whenever we control anything completely we can use it to our advantage; when, however, we cannot control a certain thing, the latter may be of use under certain circumstances, but we cannot prevent it from being equally harmful. The function of certain nerve elements of registering and conserving mental and physical actions is a sub-conscious or unconscious process which escapes our control and is therefore generally more harmful than helpful in its demonstration. In piano practice the function of this sub-conscious memory, whether we want it to or not, is, of course, constantly at work, not alone in the registering and conserving of the principal matter—the reproducing of the notes on the keyboard—but also in retaining much of the working process that never enters our awareness or consciousness. These factors, registered and conserved in our practice, may be compared with what, in manufacturing circles, are called "by-products." They are by-processes which pass unnoticed and may either be a total waste or may form direct obstacles; were their presence known they could be changed from sub-conscious, harmful processes to conscious and voluntary helpful ones.

Every technical branch has a parallel physical or muscular condition which is entirely individual, in which this particular branch differs from others. This is due, practically, to the fact that in the different branches certain parts are the principal executive parts, while other parts are merely auxiliary and supporting; for instance, in all runs and scale work as well as in arpeggios, the fingers themselves are the final individual executors and must be used accordingly in connection with it; yet in octave and chord playing the fingers must give up this individual activity and the hand and lower arm must have more freedom.

Such physico-technical states are nothing but proper muscular conditions absolutely necessary for the executing of such technic.

The arm was not adapted to piano technic but piano technic has been adapted to the arm. As a rule these physical conditions are but little taken care of, their existence is not known at all to many, and it is left to the marvelous adaptability of the muscular system to get along as well as possible. The naturally gifted pianist will sense them instinctively but the pupil without motor (pianistic) talent must be told of them. The function of registering and conserving muscular states has no conscience; it knows nothing of right or wrong, and the bad is as well conserved as the good. Should a pupil, through the carelessness of the teacher, practise a certain technical problem wrongly from a physical point of view when he first approaches it, such wrong muscular condition may remain associated forever with it without the student's knowledge and prevent him from ever mastering it.

To be able to do or not to do a certain thing on the keyboard depends upon two functions, contraction and relaxation; the first, when overdone, paralyzes motion; the second, when indulged in too much destroys control. The harmful over-contraction and stiffening of arm and fingers due to eagerness or trying to read and play at the same time together in the first

piano lesson of the beginner, are one of the by-processes conserved by the physiological memory. In many cases these may stay with a pupil and forever prevent him from making the most efficient use of his muscular apparatus, unless he should come under the care of a scientific teacher.

Making Over a Pupil

In the changing of an advanced but poorly taught pupil to a better way of playing the knowledge of the mysterious working of the unconscious memory will point the way. It is absolutely necessary not to allow the pupil to touch any of his former music until a new physical foundation has been laid. The reason for this is that whenever one of the old studies comes before the pupil's eye everything that was ever connected with it, mental, physical, even emotional states, will reassert themselves. No amount of talking, no amount of practising, will banish them, for they are integral parts of all the forces which have combined in the execution and forever stay together. This does not mean that the pupil should begin all over again; only that the teacher must dissociate the pupil's former physical condition from his technical attitude. Even in the new process of advancing, the observing teacher will find, that as conditions change for the better, with every new step, certain stages of advancement or certain grades of changed condition will remain closely connected with different studies and selections now practised.

A very effective use of this conservation of by-processes or of the co-consciousness of action can be made in correction of touch. The production of good tone is, of course, due to proper motions under proper muscular conditions; but the demand for continuous changes of these conditions within the smallest time periods makes a detailed control in active playing impossible; these changes must depend upon the prompting of the inner sense of hearing which must

anticipate the character, that is the quantity and quality of tone. But this again is closely connected with a matter of feeling and emotion in its last analysis.

All our emotional states are paralleled by muscular or physical states.

An abstract emotion not accompanied by a paralleled physical condition is unthinkable. If, then, we can associate certain emotions or states of feeling with certain compositions in such a way that they have become part of the latter, if we have succeeded in creating a distinct type of tone by making the emotional state a by-process of the technical for physical action (the playing) then we can use such an acquired or conserved experience as a model with other compositions or in general playing. For it is a principle in the function of our sub-conscious memory that when we recall the whole experience, we can recall (or it instantly recalls itself) every mental, physical, technical detail of it, even its locality in space, the place on a certain page of music, and *vice versa,* the coming into our mind of some of the details may bring on the whole complex.

Practical work furnishes innumerable cases of that kind. Teachers of experience will have noticed that the picture of a pupil who was the first to play a new addition to his teaching repertoire will be forever connected with the composition and often appear before the teacher's eye when the composition is seen on the music board.

A change in the location of the music on the paper, say in a new edition in which it is printed on the left or right side, on the top or bottom of a page, will greatly disturb us because the picture which our physiological memory has conserved in connection with the music is quite different. The change from an upright to a grand piano is apt to disturb a pupil because the distance from the music to the keyboard becomes a disturbing element, as does also the difference in action.

Conscious and sub-conscious memory are the keys to all learning and acquiring of skill.

They are forever active and a constant change from one to the other is forever going on. What has first been absolutely conscious voluntary effort, will gradually become the unconscious property of the learner. Each step of learning means a farther swing of the pendulum from the conscious to the sub-conscious mind.

All sub-conscious and co-conscious functions become conscious property if recognized, and can be used. It is like the harnessing of the power of a large stream that otherwise is going to waste. It is like making use of by-products which otherwise will go to waste; and the way to find this is to study the mind and its working. It is also removing mental and muscular obstacles from the road of progress and success.

PRACTICE AND RETENTION

But the functions of so-called memory mean more. If it is correct to say that it is what a man saves and not what he earns which determines his financial future, then the future of the student as a piano player depends equally upon what he saves in his work, and this means what he carries along to the next practice day or period. It is not how much he has practised, but how much he has retained; and although the comparison may be a trifle lame from a physiological point of view, the memory or function of memory is the savings bank of the student in which he deposits daily his newly acquired skill, newly acquired nerve-motor units to draw upon as dividends in his future playing.

A good-memory, so called, or a facile and exact working ability to retain impression is no doubt a matter of gift; but that does not prove, by any means, that a poor memory cannot be developed or educated into a very good one by proper training. Of this training concentration forms the greatest part. All

our functions can be highly raised through proper and constant applying, so that from occasional employment they are gradually developing into habits.

Shall all pupils memorize all their music? It is a question.

Memorizing has as many advantages as it has disadvantages. If, from the very first lesson, a pupil has formed the habit of relying upon memory, this faculty will grow with his other pianistic development; but if a pupil has played for several years without memorizing it is often a waste of time to try to make him do it later. Such a pupil is greatly handicapped in becoming acquainted with musical literature, for it takes too long to learn the composition by heart.

In such pupils the memory is frequently very unreliable and the nervous strain connected with playing from memory at a recital is often out of all proportion to the result gained; beside the constant fear of forgetting often mars the whole playing. Whenever memorizing is required the process should be properly analyzed and explained to the pupil and the method found out by which each pupil may accomplish it best. Thus the pupil may go about it in a systematic and conscious way and know what he does.

Unfortunately the average pupil does not learn to play piano for self-culture or his own benefit and pleasure but for the benefit (often quite doubtful) of others, to entertain. Of course, in such cases, it is essential that the player must have two or three showy compositions always ready. But music and piano lessons, given and taken solely with this purpose in mind, hardly fulfil their true purpose and must be considered on the level with boxing, fencing, swimming and other lessons, which teach tricks, but have nothing to do with the art of music proper.

Attention

Two mental functions are inseparably connected with the learning and acquiring of skill,—in fact they

the *the* process themselves: Memory and Attention. Looked upon superficially their working *modus* seems to have but little in common; they may even appear distinctly different from each other. Yet, like all other functions and faculties of the human machine, they work most harmoniously together. Co-ordination, co-operation, is the watchword in the mental as well as in the physical engine. An isolated function does not exist in nature, and consequently not in the human body.

Memorizing is the result of associating facts, images, ideas, connecting one with many others, bringing many to bear upon one subject. It means broadening, enlarging, expanding the brain processes, sensations and ideas. Attention means the restriction of the field of selecting our ideas from among many, the focusing of the interest upon one spot, one matter, one idea. If memory is like the free light that spreads over all, attention is like the shaft of a searchlight that concentrates all available power directly upon one spot.

ATTENTION COMES FIRST, MEMORY AFTERWARD.

Attention must precede the function of memory. It is the conscious period of learning, of acquiring, which makes possible the sub- or unconscious period of possession later on. Attention means narrowing of consciousness. When but one idea fills the mind so completely that we have neither ear, nor eye, nor any other sense open for anything else, our attention has full sway. Then and only then is our attention riveted upon this matter.

When we look upon a page of music it enters our mind in its total as a composite picture. We may remember how it looked as such, covered with runs or chords, octaves or arpeggios; we may have an impression such as we get of the topography of a landscape as seen from a hilltop; and we will recognize the page through this picture, conserved by the physiological memory, when we see it again. But when we

wish to study or practise the music on the page the picture of the whole page immediately disappears from the mind, and we see only the first measure; or, if we have but little experience in reading, only the first count. We see only what we are interested in, we have narrowed down the picture of the whole page; we see only that which our attention wishes to see; and yet we must see, physically, the whole page so long as it remains in the focus of our eyes.

Attention, like all mental processes, is grossly misunderstood. It is not a separate department of the brain and the mind to be used, but a by-process, an auxiliary function of all mental and bodily activities. But while memory is automatically active all the time, always a part of all our action, work and thoughts, attention is like an electric current which can be switched on and off *ad libitum*.

In practising eye and ear play their well-defined parts according to their physical construction and limits. The organ of attention is preeminently the eye; the organ of memory, the ear. As we proceed we let the eye travel from note to note, from measure to measure, training it like a searchlight on spot after spot; and with it travels Attention. Paying attention is a process which must forever be renewed from moment to moment. It comes in single beats of but very short duration. It is "the temporary and exclusive adaptation of the individual to one predominating thought." [Ribot] Its driving power is the human will which must hold it to the subject; otherwise it will slip away, as it is forever lured from its object by outside forces which wish to interfere with it. Attention therefore demonstrates itself not alone as a definite, positive force but also as an inhibitory one of power.

Two different kinds of attention are possible: Passive and Active, Reflex and Voluntary; attention coming from the object that enters our radius of sense, and attention which we supply to the subject before us.

The passive attention is the interest the matter itself furnishes, which attracts our attention often even against our will, as, for instance, a bright spot, a sudden flash of light, a sudden noise. Passive attention is latent in everything new or strange. It is almost impossible to separate it for a while at least; it is, so to speak, one of the properties of a new subject. Yet it decreases as soon as the newness wears off.

As soon as that happens it must be supplanted by voluntary or active attention, by our own effort, our own interest. Attention now becomes an attribute. As the matter ceases to interest us any longer through its newness we must interest ourselves in the matter, if we wish to keep it on or in our mind, which makes quite a difference.

With children passive attention is the rule.

It is in everything. Voluntary attention is a tremendous task which seldom can be kept up for any length of time because the power of inhibition, which must keep other matters from interfering, is but little developed.

Voluntary attention is short-lived and must be constantly renewed.

It is not like a shower which spreads over everything at once, but like little dewdrops which hang on each separate petal.

The attention we pay in practising to one measure is of no use to the next which requires a new effort; the attention bestowed upon one finger in a new, difficult passage does not benefit the next; each finger must be separately awakened; each finger placed separately, and when it is through with its performance it goes to sleep until attention attacks it again or until memory or habit has taken hold of the passage and reduced the amount of attention necessary thereafter.

Attention is the function of the eye, the conscious faculty which makes possible the benefit of the memory of the auditory and muscular senses, the savers of mental energy.

To arouse voluntary attention a personal effort is necessary.

We must interest ourselves, we must will to be attentive. A single impulse, unless it is very strong, is seldom sufficient; the glance upon a strange, unusual chord is hardly sufficient to impress it upon the mind. It requires many repetitions of this attention process, attack after attack for a short while, the lingering over it a while until the matter has crossed the threshold of our consciousness. Here again the eye, with its ability to rest indefinitely upon a subject, is superior to the ear with its temporary short periods allowed for perception of stimuli.

Equally difficult is it to keep the attention focused in even strength for any length of time upon one subject. The longer the attention must be focused upon one matter the greater the effort we must make to keep it up, on account of the using up of energy. It becomes a case of overcoming physical fatigue; the nerve elements are simply used up, and an ever greater effort is required to accomplish the same amount of work as we keep at one study of technical problems.

The last fact is of great importance in the work of children. A child's mind is ever and ever active; it is always wide open, looking for trouble; and plenty of new trouble comes to it constantly from all possible and impossible objects. In trying to hold a child's attention this must be reckoned with.

One must closely watch the child, changing the subject or presenting it from an ever new point of view as the attention waves of the child subside.

To admonish a child "to pay attention" is of no use whatever. If attention has gone it is not the fault of the child but that of the teacher. There are signs which will tell a teacher when it is time to change, such as restlessness in position, eye wandering away from the teacher's eye, on the keyboard straight fingers, especially in grown up pupils. Our muscles are like springs held in place by a general tension of the central

nervous system known as *tonus;* when attention travels away from the keyboard this tension stops and the fingers stretch themselves unconsciously.

In the beginning lessons separation of keyboard and music-board work provide an excellent means of change of subjects. It may also here be remarked that lessons of an hour to beginning children, or the requirement of an hour's practice for children, is gross nonsense. Often one-half hour overtaxes the ability of a child to be attentive. All work done after that is not alone a waste of nervous force but apt to do positive harm.

The length of attention periods at the disposal of pupils differs greatly in individuals. It is a curious fact that the brighter pupils often have shorter concentration periods than pupils of slower mentality. I have made records of a large number of students and found much interesting and different material. The average in children of twelve to fourteen years proved to be from fifteen to twenty minutes. After that the subject had to be changed.

Attention is subject to many influences often entirely beyond the control of the pupil.

There are times when outside matters so completely fill the mind that there is no room for anything else. Again, as attention is practically will power, and will power depends much upon physical condition, this also enters into the question. Neither are lack of concentration and lack of attention always due to lack of interest. In many cases they are faults that exist in the mental make-up of the student. But this does not mean that the fault cannot be remedied and a different state of mind and a different *modus* of working be-gradually substituted for it. Such pupils generally lack energy and push in everything; they show this lack in every action, in their speech and their walk; they are mentally loose-jointed, and lack backbone in anything connected with them. Here it means complete change of the pupil's ways; not a small job, yet one

which must be undertaken and accomplished if the piano teaching is to have any result. It calls for bracing music, sight reading, ensemble playing, which requires presence of mind, skipping from bar to bar; in other words, presentation of ever new material to keep the pupils on the run. For the chief problem is to stimulate, constantly, something that is forever flagging, to keep awake something that forever wants to go to sleep, the interest in the work.

Again we find the lack of concentration in the pupil who is too active, is forever talking, and skipping from one thing to another. Here slow music, and above all, Bach, who will stand no guessing, serves that purpose. All these are deep problems. They confront the music teacher and are obstacles which must be cleared before the real music can show any result.

The general remedy is the establishment of different habits and, oftener, the building up of the habit to concentrate where there was no habit at all before.

There are periods in the day when it is easier to concentrate, because the general tone feeling is better. There exists a certain rhythm of mental work which depends upon the progressive using up of nervous energy during the day dependent upon external conditions. According to Donaldson (*Growth of Brain*) the best time for work is about 11 A. M.; then the wave decreases towards 4 P. M. and reaches its maximum height again about 9 P. M.

We hear much about practising six and eight hours by professional virtuosi. No human being can perform this miracle and be fully attentive. Most of these stories are mere press agents' stories. A concert pianist who has to practise eight hours a day to keep his technic and learn his repertoire, never is, was, or will be a virtuoso; he will never get beyond the state of a piano player. When it refers to simple endless repetition of technical material, done mechanically, that is another matter; but the very fact that such a man is a pianist is the second refutation of these

claims, for his perfect muscular sense asserts itself and makes such increased mechanical work absolutely unnecessary.

Perhaps it may seem from the foregoing that attention is consuming an enormous amount of energy. On the contrary it is really, when properly applied, a great economizing force, because it enables the mind to deal with only a few of the many sensations which constantly pour in upon it.

It cannot prevent irritations from entering at all so long as the senses function properly; and very often the strength of such stimuli makes it hard to keep them away from the inner mind. But it can prevent them from locating for good and becoming a burden upon the memory. Attention well applied can make every minute of work count, and thus shorten labor and save energy. But it is not an automatic function like memory. We must apply it ourselves; and we can do it only when we interest ourselves in our work, and apply our will power. Here again we connect with association; for the more we learn about our work the more interesting it becomes to us, and the easier it will be to attend to it.

The lack of concentrative power is the greatest drawback in learning.

Practice supposed to bring results depends, first, upon correct perception of the musical material (symbols); next, upon the conservation of correct technical capital. But unless a pupil pays attention, especially in the beginning, these matters will not be registered correctly. Lack of attention brings wrong fingering, wrong notes, wrong keys, and makes impossible the establishment of correct nerve-motor units, the making of correct nerve paths.

The only way to avoid all these matters is to practise slowly and slowly, and slowly again. Even talent is no substitute for this rule or exempt from it. If what we do today must be the starting point of what we are going to do tomorrow, then unless what we

have done today is absolutely correct and saved correctly into the morrow, what we have done today was but a waste of time and energy. In this principle lies the whole secret of all success and failure. Here is the reason why hours and hours of practising by the average pupils produce no satisfactory results whatever.

It seems therefore necessary that, above all, the pupil should know how to concentrate, and that this faculty should be stimulated. If the "leading inquiry in the art of education is how to strengthen the memory," it is surely equally important that we first teach attention and concentration, and clear the pupil's mind in regard to these matters, that he may use his faculties consciously and to the utmost advantage, and thus acquire knowledge and skill in the easiest and quickest way possible.

Charles Darwin calls attention the most important faculty of the human mind. It is indispensable in education, and its influence reaches still further; for "what holds our attention determines our action." But its close dependence upon will power makes it the function which shows character most directly. Stimulating the exercising of this function also stimulates the building of character, the asserting of man's own and his best self. It is mind first and motion afterwards.

How strong a factor the mind is in controlling motion the following experiment with a watch will prove better than anything else: Hold your arms easily bent before you, so that your hands are in line with your eyes. Hold a watch by a chain so that it may swing easily in every direction. Now without stiffening up your arms so they may have free play, concentrate your mind sharply and exclusively upon the idea that the watch should swing from right to left. After a while the watch will gradually move and, as its movements increases with each swing, it will soon be swinging quite freely in the desired direction. You may stop it, rotate it, do anything with it, simply by

concentrating your mind upon it. Also it is possible to make the watch move in response to a command of somebody else.

There is nothing mysterious about it. Of course the arms will move the watch; but these arm motions are so insignificant that they are almost invisible. Yet they are sufficient to start the watch and keep it moving, so long as the mind really concentrates its power upon the movement and anticipates it.

If this can be done with a watch why not use the same method with your arm, hand and fingers in connection with the keyboard. It will work with the same precision. "The mind commands, the body can only obey."

WILL POWER

The human machine is organized and constructed upon the principles of co-ordination of the different parts which is also the chief principle of all machines. In spite of our intellectuality the work of the body is mechanically subject to the great law of cause and effect. That we can interfere with this law, that we can change the process of mechanical co-ordination, that we can make use of some of the bodily functions for other than the intended purposes is due to a power which apparently is superior to the mechanical function. This power is known as will power, the supreme function which regulates the course of the life of each human being and his actions.

It is *will power* which keeps up the relationship between mind and idea. It is WILL POWER which stands back of attention and keeps it focused upon one subject. It is *will power* which is closely connected with and is responsible for what we interest ourselves in. It is *will power* which is responsible through the interest we take in a certain matter, and through the attention we devote to it, whether it becomes a part of our own and will stay in our memory or will pass by unregistered.

This short chain of connected functions, which is responsible for the fact that out of the dark soil of unawareness, of unconsciousness, finally grows the flower of knowledge, brings the success of all our efforts back to the Self. It puts the mutual work of teaching and success upon the pupils where it belongs.

No teacher can succeed without the earnest effort of a pupil to make the proper use of his will power. He must do nine-tenths of all the work. The teacher cannot create forces. He cannot create new faculties beyond those the pupil brings to him. He can only develop these forces to the utmost capacity; he can only guide them into roads which lead most directly to success.

A great difference exists between wishing to do a thing and willing to do it. In the carelessness of expressions, with the little attention that is paid to subtle shades of meaning, "a wish may be the father of a thought"; but a wish is never the father of a deed or action unless the wish is backed up by the will.

Willing is the actual carrying out of wishing. Many persons wish to play piano, but only those who will to play, only those who will to work, are the ones who succeed.

Like all manifestations of the mind will power can be developed and trained to a high degree by constantly exercising it, by constantly applying it, and by constantly satisfying it. It is trained by the unfaltering carrying out of everything we have once wished to do. The inseparable by-processes of will power are perseverance and tenacity. In fact all three are but one force.

The different centers of the central nervous system always work co-ordinately. Thought and motion or feeling and motions can never be separated. By thinking a certain passage on the piano I unconsciously stimulate certain motor centers and execute it subconsciously. But of course I receive the full benefit only if I actually execute it. The process is the same

in all centers. The mind has no consciousness of an outgoing discharge as such. We do not know of the effort made until a sensation, the activity of one of the senses, informs us of the *fait accompli.*

The motor centers work automatically, doing the good and the evil with equal efficiency, and it is due only to attention and interest if we do the right instead of the wrong. What interests us claims our attention; but we can hold what claims our attention only if we will to do so.

The amount of will power varies with different persons; yet perhaps it is not so much the amount that varies as the ability to take hold of it and use it. The absence and presence of it should not be a basis for reproach or for praise, for it is too closely connected with vitality and general physical condition.

Persons of vigorous health, of plenty and healthy blood generally have will power. Pupils of anæmic constitution, those who are physically weak, are very seldom energetic and often quite unable to exert their will power properly. Hand in hand with physical conditions goes temperament. Pupils of sentimental temperament, of dreamy disposition, generally lack will power or the desire to exert it. Pupils of poor rhythmic feeling also are often deficient in this way. For rhythm is accent, and accent is will power. Observe this fact in pupils.

The progress of a pupil is not always bound up with the music and the keyboard. Often much must be cleared away before we come to the true pupil, who is to do the musical work. It is often necessary to influence the whole temperamental make-up of a pupil before we come to a basis from which we can start to build. Sometimes it means a change in the whole way of thinking, by dissociation of wrong ideas. Above all nothing can be done unless you get the whole system of the pupil in a healthy condition. Often this is quite as much the work of a competent physician as it is of the music teacher.

Proper musical material, as for instance the *Polonaise* in A, by Chopin, with its stimulating harmony and rhythm requiring muscular effort from even the most lackadaisical pupil, might awaken and stimulate slumbering will power; proper reading matter, outdoor life, the taking up of a vigorous sport, such as tennis, and so on will all have an indirect effect upon the playing of such pupils.

For self-training, the scrupulous carrying out of every desire that can be carried out, the changing of every desirable *wish* into a *will* and corresponding deed, is most beneficial. Thought and action belong together; if thought is not followed by the motion the process remains incomplete. It is very easy to get into the habit of doing a great deal of thinking without acting, and store up many unfinished projects, with the ultimate consequence that, as we never carry out what we wish, we foster in us the feeling through experience that we cannot carry out anything. Soon we even cease to wish.

This feeling of doubt is known to the psychopath as a distinct mental abnormality, known under the name of *"follie du doubt."* The remedy for it is to stop doubting and "to get busy," to get to action, whether we are successful in the beginning or not, remembering that there never was any success but had a failure for a stepping stone.

No doubt the familiar saying "where there is a will there is a way" is correct; but at the beginning of the way stands the first deed which opens it up.

The thorough teacher must, above all, be a sympathetic person, one who, by his own sensitiveness, can feel the organic shortcomings of his pupils. Most obstacles in the way of success are mental, such as any teacher has to deal with, and need not necessarily to be musical obstacles. In such cases care must be taken not to bother a pupil with material he dislikes. Everything that is given must be interesting, must be stimulating, and have an incentive to do the task. Especially

must children be humored in such cases. If they dislike scales and exercises a piece full of scales, with a picture on the front, will fool them and ultimately accomplish the desired result. The main object is always to make a child "do," to keep up the interest once awakened; the increase of will power will come by itself.

Any pupil with a normal ear is musical; every child loves music and has an ear for it unless he is deaf; every muscle, unless paralyzed, is able to move and to execute commands of the brain. The rudimentary efforts of piano playing have no artistic elements in them; they call but for normal, mental and muscular cooperation. If the success is not what it ought to be the failure is due to interruption in the communications, to the traveling of wrong roads, to faulty stimulation through misunderstanding, or to thoughtless work on account of lack of attention. Association of matter, too, should remain separated, and many such matters belong as much to the realm of the psychologist as to that of the music teacher.

Music is a matter of feeling, piano playing a matter of motion, with all the phenomena at work that are connected with all motions for all purposes.

SUGGESTION

In following the path of learning we will notice a road leading from the conscious to the unconscious, from the voluntary to the reflex or mechanical. In considering this we have been impressed with the necessity and importance of the asserting of individual effort and power. It has been proved that in spite of all the methods, short-cuts and tricks of learning, in spite of the correct leading and guiding of good and experienced teaching, in spite of all the means and the labor brought to bear upon the student from *without,* the principal effort must come from *within.* It is the student himself who must do three-fourths of the work. Teaching can only tell him how to work and

what to work with. We have, then, always two forces which must work harmoniously together, one from without, the other from within.

We have learned that whatever becomes our mental property does so through our senses and can be reached again and at any time by paths leading back to it—voluntarily or involuntarily—due to the functions of our so-called physiological memory. Our conscious mind is paralleled by a sub-conscious one. The conscious mind is the foreground, the sub-conscious the background. The first is the surface of the sea of our impressions, the other represents the body of water below of varying depth. From the foreground, from the surface, matters vanish into the background, sink to the bottom.

But there is still another state below the sub-conscious, which state of mind represents our original self, before either consciousness and sub-consciousness were filled with ideas resulting from the experiences of life.

Emerson writes: "What we commonly call man, the eating, drinking, planning, counting man, as we know him, does not represent but mis-represents himself. Him we do not respect; but the soul, whose organ it is, if he would let it appear through his actions, would make our knees bend." The same thought is expressed by Meyers (*Human Personality,* etc.). "The part thereof which emerges into consciousness is little compared with what remains buried, but operative nevertheless."

Leaving aside this poetic conception and description it refers to a part of our existence which might be termed virgin soil, most wonderfully adapted for the planting and growing of seeds. To reach this part, to reach a part where an idea can lodge, grow and spread without being interfered with, without being hindered, without being crowded aside, is of the greatest importrance to the teacher and educator in general, and this can be effected from within or without.

In dealing with attention we found that when we are attentive to but one matter, this completely fills our mind to the absolute exclusion of everything else. Such an idea has then the whole field to itself and has command of all the forces. The state here referred to is somewhat similar to that. In order to be fully attentive we must succeed in pushing aside all other matter which fills our minds and get in front of it. To get to the state of mind where we find this virgin soil we must break through everything else, the consciousness and unconsciousness, and get beyond it. Therefore as this state is beyond these borders, it is called the transliminal—"beyond the border."

Teaching is leading, making a pupil do what he generally would not do by himself, arousing interest in matters which are foreign and new to him. All this mental guiding is really done by suggestion.

We recognize two kinds of suggestions, one coming from without through the teacher and adviser, the other (auto-suggestion) coming from within through the pupil's effort himself, which does not preclude that what he may suggest to himself, may have been furnished by his teacher.

Many things are necessary in order to make suggestions by teachers successful; one is that they are made with sufficient force and absolute sincerity; another is that the subject of the suggestion is in the proper condition to receive and absorb them; "for suggestion from without must for the most part resolve itself into suggestion from within" (Meyers, *Human Personality*).

Talking to an unwilling, balking child is a useless waste of breath, until the mood is changed favorably. It is also necessary that suggestions are clear and sharp and to the point. To children they must be given in a language a child can understand, based upon the facts of the child's life, perhaps in the shape of a little story leading to the proper point. Personal force and magnetism, which are gifts of nature, form one of the

greatest assets of the teacher. But where they do not exist, seriousness of purpose, strong personal will, sincerity and, above all, the authority and assurance which are a result of the thorough mastering of the subject, are acquired substitutes for the other natural gifts.

Auto-suggestion and will power are strongly co-related. It has been said that right thinking will bring about right acting; in other words, what the mind prompts the body will carry out. If one's mind is completely filled with the desire of accomplishing a certain task and does not allow any other desire to interfere with it, one suggests to himself, at all times, the carrying out of this desire. Nothing can prevent it from being carried out.

There are times when we are in a specially advantageous physical condition to make such suggestions to ourselves. These times are when we are but little disturbed by the life surrounding us. Our mind is like the soil. Whatever you put in, whatever seed you plant, must grow if it has a chance. If a pupil plants in his mind, persistently and constantly, that he will succeed with his studies, this auto-suggestion must reach that *trans-liminal* state where it has a chance to take root and grow.

The best times to make suggestions which we hope will alter conditions not to our liking or advantage is the time shortly before we go to sleep, that peculiar state when half-awake and half-asleep. Suggestions made to ourselves, desires expressed at that time have a fair chance to take root and grow. The proof that the mind keeps on working and does not lose what has once taken hold of it is found in a very familiar proceeding. If, before going to sleep, you suggest to yourself to awake at an unusual hour, the command thus instilled, will, so to speak, watch the time and awaken you at that hour.

Proper auto-suggestion is everything in achieving success in learning. If a pupil constantly discourages

himself by saying "I never will be able to do anything" it is not only a foregone conclusion but a physical necessity that he never will accomplish anything. For by a perversion of thought he constantly suggests to himself the very thing that he does not wish to happen. He has his mind on his prospective failure and he will fail. It is the teacher's duty to change such thoughts and substitute the suggestion that the pupil *will* succeed, driving from his mind the thought of failure.

If a pupil is constantly told by his teacher that he cannot succeed the latter undoes his own teaching. One cannot be too careful with children in making remarks. Often a remark like this: "You are too stupid to do anything" is likely to remain forever in a child's mind, to paralyze all effort and prevent all success.

Again when in playing at a recital, a pupil's mind is anxious to prevent mistakes, the body which is thus prompted will oblige the mind and make them. The proper control of a teacher's mind over that of the pupil can greatly be strengthened through the influence of suitable suggestions. Above all a teacher must try to penetrate his pupil's mind, try to find its working mode, and then mould it into the proper shape, lead it into the right direction. The physical forces cannot do anything without being stimulated by mental forces; and the more direct and strong these commands come the more will be accomplished.

The matter of suggestion in dealing with the encouragement of a pupil is a difficult and delicate matter because when applied wrongly it may accomplish the opposite. More pupils are daily spoiled through excessive praise than through excessive criticism. In making suggestions to a pupil, especially to a child who needs this sort of encouragement, it is well to keep in mind that we are always dealing with the future. It is well enough to praise a pupil for what he has done, but this refers to the past. Outside of the present pleasant sensations it carries but little value for the future advancement.

It is much better to tell a child that he *will* be a fine player than that he IS. The *is* refers to something accomplished, something finished, that does not require any more effort; but the *will be* is a constant incentive, a driving onward, a pointing forward, a goal to be reached, constantly before the mind. The fun is in getting there; the one who has arrived stops traveling and rests.

And this pointing towards the future and keeping moving towards a final goal brings to our attention one of the greatest forces for improvement and success, always at our call for our own benefit, and that is imagination. Imagination is far more powerful for purposes of advancement than will power. Will power is like electricity. We can switch it on and off, but it is not permanent; whereas imagination, once it has taken firm root in ourselves, is like a lasting permanent force. It cannot be shaken off, its voice cannot be stilled, the images it holds up to us constantly cannot be wiped out or even blurred. Like the North Star which guides the skipper it steers our little ship of life and leads it towards the haven, the wished for success, never veering from its course.

Gradually, without violence, even unbeknown to ourselves, it moulds our thoughts and shapes our actions. If a teacher can stimulate the dream of success, the imagination of his pupils towards an end to be realized, that is to be a good player, a fine musician, the rest of his work becomes easy. It is merely guiding of the pupil and keeping him in the middle of the road.

Resume

When one string in a piano is set to vibration and the damper pedal is put down, all strings related to the sounding string begin to vibrate in sympathy. When a strong, forceful orator holds his audience spellbound, he does so because he has established sympathetic vibration in his listeners. Between teacher and pupil the same feeling must exist, if the work is to have any value beyond the commercial bargain.

It is true that in spite of the untiring work of great psychologists, such as Wundt, James, Münsterberg, and others, we have penetrated but very little into the wonders of the mind. Most of our knowledge comes by indirect means; yes, most of it comes from negative sources, by observations of abnormal or impaired minds, and by deductions from these conditions as to the normal mind. Yet pedagogic psychology is today an established science and the teacher in possession of this knowledge, no matter how little it may be final, is surely better equipped than the teacher without it.

Knowledge is a matter of mind, and the study of the mind is the royal study. No one has a better opportunity to indulge in it than the teacher. Nothing is more wonderful, the *Arabian Nights* tales pale before it, with its surprises and miracles, when one has once gained access even to what little territory is so far open to us.

Whatever we do we do through the mind; whatever we enjoy, whatever we suffer, we enjoy and suffer by it; all success comes from it, all failures revert to it. Then why not try to become acquainted with it and

study it. It will keep a teacher's otherwise monotonous material forever fresh through ever new surprises; it will appear to him as a new and different material with every new pupil. With children it is the joy of life. Is there anything more fascinating than to have the inquiring eyes of an eager child resting upon you searching for knowledge? Is there anything more interesting than to watch the unfolding of the most beautiful of all flowers, the young mind and see it grow? Is there anything more gratifying than to see how, gradually, out of errors and misunderstanding, the true knowledge slowly rises and opens a vista into the kingdom of the music of the masters, that wonderland of beauty and mystery into which the mind may ever retire, the soul find rest, when life with its burden and trouble becomes too much, to be carried any further?

At present there are few works in the market which treat of piano teaching from the strictly physiologic point of view. Dim as our knowledge of the inner life still is, it is more problematic to deduce from the works of our great savants the rules for the study of piano. Wherever psychology is mentioned in connection with music it mostly deals with the metaphysical part of it, its power, and so on, matters that are not of much practical value to the teacher's work, no matter how it may be otherwise beneficial to him.

The reader is therefore advised to follow the matter up in the proper works dealing with it exclusively, above all in James, *The Principles of Psychology*. First the briefer course should be taken, then the larger, which has also practically been made the basis of this work; the other works mentioned in the bibliography have been studied to great advantage and profit. Keen, restless observation of one's own mind will supply wonderful and profitable instances to supplement the theoretical reading; and above all the pupil's mind with its constant undulations will be an inexhaustible Golconda and gold mine.

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SUMMARY

1. All actions outside of our functions of living are the result of mind action through the Central Nervous System.

2. Piano playing is mind work first, muscular work afterwards.

3. Piano playing consumes energy which is expended economically through skill.

4. Our Central Nervous System is a system of cells and nerves which cover the whole body.

5. All our motor actions are arranged in the spinal column.

6. The brain is a continuation of the spinal column, and is not mind, but merely a physical engine.

7. Every thought and feeling is connected with action, whether carried out or suppressed.

8. Practising is forming motor units, which are conserved whether they are right or wrong.

9. All sensations arouse different actions in our brain; these are called perceptions.

10. Our senses are always right but an incoming stimulus may be subject to wrong association or interpretation.

11. The sense of seeing is intellectual, that of hearing, emotional.

12. Piano playing is a matter of muscular-sense-control.

13. Our motor sense deals with location and space, our muscular sense with volume through key attack.

14. Our sense of touch is a controlling and reporting sense.

Coordination

15. A muscle never works alone; different groups always coordinate.

16. The mind educates the muscles and they, in return, educate the mind.

17. Practising is smoothing out the coordinations and the exchanges between mind and muscle.

Action

18. All our artificial actions are first voluntary, then semi-voluntary, and finally reflex.

19. Every repetition of an action profits and is made easier by the preceding one.

20. Constant repetition results in habit, reflex action, and in economy of muscular energy.

21. To repeat with muscular correctness it is necessary to have a correct mental conception.

Memory

22. Memory is a part of everything we sense, think, feel, or do.

23. The process of memory is registration, conservation, and recall.

24. We have a conscious and co-conscious memory.

25. The unconscious memory is the registration of sensations of which we are not aware.

26. The co-conscious memory deals with experiences awakened by recall.

27. We can recall a whole experience, and also any part of it.

28. Learning is only possible through memory.

29. Only in memorizing do we use conscious memory.

30. Learning means the decrease of conscious in favor of unconscious memory.

31. The chief principle in learning and practising is to save through habit from one working period to the next.

Attention

32. Memory and attention are inseparable.

33. Memory is gathering facts to strengthen one; attention is singling out one fact from the many.

34. Attention comes first, memory next.

35. Attention is the conscious, memory the unconscious part of learning.

36. Memory is beyond control, attention is a matter of controlled will power.

37. We have two attentions, active and passive.

38. Passive attention is furnished by the object itself, active attention is given to it by ourselves.

39. All passive attention must ultimately be replaced by active attention.

40. Attention comes in waves, and must be constantly renewed.

41. We are not attentive until a matter fills the mind completely.

42. The inability to control attention is the chief obstacle in learning.

43. Practising will not bring results without memory, memories cannot be established without attention.

44. Attention and memory are the most important faculties of the human mind.

Will Power

45. A great deal of difference exists between a wish and a will.

46. Many things claim our attention, but we keep only those which we *will* to keep.

47. Will power is a gift, like vitality, yet it can be increased through training.

48. This is done by reluctantly carrying out what we once have decided to do.

49. The road of learning leads from the conscious to the unconscious.

50. In spite of the efforts from without by the teacher, the main effort must come from within by the student.

51. Besides conscious and unconscious state, there exists also the sub-conscious, which represents the true self of us.

52. Two suggestions are possible, one from without by others, one from within by ourselves called auto-suggestion.

53. Proper auto-suggestion is the main source of success; improper that of failure.

54. Emulation and the example are physical "suggestions" and parallel to the mental.

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